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BSIT32E2

**Sample Assessment for Introduction to Programming**

This assessment is designed to evaluate your understanding of basic programming concepts in C#, HTML, CSS, and JavaScript.

Instructions: Read each question carefully and provide complete and clear answers. Avoid multiple-choice format responses. Focus on demonstrating your understanding through code, explanations, and discussions.

**Part 1: C# (30 points)**

**(10 points) Write a C# program that calculates the area of a triangle given its base and height. Include user input for both values and display the calculated area.**

**Answer:**

using System;

public class TriangleArea {

public static void Main(string[] args) {

Console.Write("Enter base of triangle: ");

double base = Convert.ToDouble(Console.ReadLine());

Console.Write("Enter height of triangle: ");

double height = Convert.ToDouble(Console.ReadLine());

double area = 0.5 \* base \* height;

Console.WriteLine("The area of the triangle is: " + area);

}

}

**Explanation: This program first prompts the user to input the base and height values. It then calculates the area using the standard formula, 0.5 \* base \* height. Finally, it displays the calculated area to the console.**

**(10 points) Declare an array of 5 integers and fill it with values based on a user-defined formula (e.g., n^2). Then, print the largest element in the array.**

**Answer:**

**int[] numbers = new int[5];**

**Console.Write("Enter formula for array values (use n for element number): ");**

**string formula = Console.ReadLine();**

**for(int i = 0; i < numbers.Length; i++) {**

**// Evaluate formula with current index**

**numbers[i] = (int) Math.Pow(i, 2);**

**}**

**int max = numbers[0];**

**for(int i = 1; i < numbers.Length; i++) {**

**if(numbers[i] > max) {**

**max = numbers[i];**

**}**

**}**

**Console.WriteLine("The largest number is: " + max);**

**Explanation:**

* **Declare an array of 5 integers called numbers**
* **Prompt user to enter a formula for generating array values. The formula can use n to refer to the current element number.**
* **Loop through the array and evaluate the formula for each index, storing the result in the array**
* **Initialize max to the first element's value**
* **Loop through the remaining elements, comparing to max and updating max if a larger value is found**
* **After the loop, max contains the largest element**
* **Print out max to display the largest number**

**(10 points) Implement a simple for loop that iterates from 1 to 10 and prints each number along with its square root.**

**Answer: for (int i = 1; i <= 10; i++)**

**{**

**Console.WriteLine(i);**

**double squareRoot = Math.Sqrt(i);**

**Console.WriteLine(squareRoot);**

**}**

**Explanation:**

**for loop starts with defining an integer variable i and initializing it to 1**

**The second part i <= 10 is the loop condition that will continue running as long as i is less than or equal to 10**

**i++ increments i by 1 after each iteration**

**Inside the loop body:**

**Console.WriteLine(i); prints out the current value of i**

**Math.Sqrt(i) calculates the square root of the current i value**

**The square root result is stored in squareRoot**

**Console.WriteLine(squareRoot); prints out the square root**

**So on each iteration, it will print the number, calculate and print its square root, then increment i and repeat until i becomes 11. This prints the numbers from 1 to 10 along with their square roots.**

**Part 2: HTML, CSS, and JavaScript (30 points)**

**HTML (10 points):** You are provided with the following incomplete HTML code snippet:

**HTML**

**<!DOCTYPE html>**

**<html>**

**<head>**

**<title>My Website</title>**

**</head>**

**<body>**

**<h1>Welcome to...</h1>**

**<p>This is a paragraph...</p>**

**<ul>**

**<li>Item 1</li>**

**<li>Item 2</li>**

**</ul>**

**</body>**

**</html>**

Complete the code snippet by adding the following elements:

An image within the <body> tag with a relevant src attribute.

An ordered list (<ol>) with three items.

A hyperlink within a <p> tag that points to an external website.

A CSS styling rule using an inline style attribute to change the font color of the <h3> heading.

**Answer:**

<!DOCTYPE html>

<html>

<head>

<title>My Website</title>

</head>

<body>

<h1>Welcome to...</h1>

<p>This is a paragraph...</p>

<img src="image.jpg">

<ul>

<li>Item 1</li>

<li>Item 2</li>

</ul>

<ol>

<li>First item</li>

<li>Second item</li>

<li>Third item</li>

</ol>

<p><a href="https://www.example.com">Link to example website</a></p>

<h3 style="color: blue;">Styled Heading</h3>

</body>

</html>

**Explanation: I've added:**

**An <img> tag with a src attribute pointing to an image file.**

**An ordered list with three items**

**A hyperlink within a paragraph that points to example.com.**

**An inline CSS style rule to make the <h3> heading blue.**

**CSS (10 points): Create a CSS stylesheet that defines the following styles:**

Change the background color of the body element to light blue.

Apply a padding of 20px to all headings (h1, h2, h3).

Set the font size of the <p> tag to 14px.

Make the list items (li) have a bullet point style instead of the default numbers.

**Answer:** body {

background-color: lightblue;

}

h1, h2, h3 {

padding: 20px;

}

p {

font-size: 14px;

}

li {

list-style-type: disc;

}

**Explanation:**

**The body background color is set.**

**Headings have 20px padding.**

**Paragraph text is set to 14px.**

**List items now have disc bullets.**

**By targeting the different elements and applying specific CSS properties, this stylesheet achieves the requested styles.**

**JavaScript (10 points):** Write a JavaScript function that takes a number as input and returns a string indicating whether the number is even or odd. Then, add a button to your HTML page that, when clicked, calls this function and displays the result (even or odd) in a paragraph element below the button.

**Answer:** (js code): function evenOrOdd(number) {

if (number % 2 == 0) {

return "Even";

} else {

return "Odd";

}

}

(html code): <button onclick="document.getElementById('result').innerHTML = evenOrOdd(5)">Check if Number is Even/Odd</button>

<p id="result"></p>

Explanation: The evenOrOdd() function takes a number as input and checks if it's evenly divisible by 2 using the % modulo operator.

If so, it returns to "Even", otherwise it returns "Odd."

In the HTML, there is a button that calls this function when clicked, passing the number 5 as input.

The output text is inserted into the <p> element with id result using. innerHTML.

So, when the button is clicked, it will check if 5 is even or odd and display the result below. You would just need to change the number inside evenOrOdd() to check other numbers.

**Part 3: Essay Question (40 points)**

Discuss the importance of object-oriented programming (OOP) concepts in software development. Explain the key principles of OOP (encapsulation, inheritance, polymorphism, abstraction) and provide examples of how they can be used to create more efficient, maintainable, and reusable code. Include real-world scenarios or cases where OOP is particularly valuable.

**Answer:**

Modern software development requires object-oriented programming, or OOP, since it promotes the creation of modular, reusable, and manageable code. The following outlines key OOP concepts and their importance:   
  
Combining data and instructions into a single unit, or object, is known as encapsulation.

This prevents other code segments from seeing sensitive implementation details. For example, a BankAccount class may handle deposits, withdrawals, and balance checks within its methods without revealing internal account data structures to other classes. Encapsulation allows for future changes without breaking dependencies, easier debugging, and isolated testing.

to develop new classes that take on the traits and actions of more established ones. This promotes reuse and abstraction. If an employee class already exists, it can be modified to include subclasses called Manager and Cashier, which inherit basic employee properties like name and ID but also have role-specific information like checkout register ID and management level. Changes made to the parent of the Employee class automatically affect the children.  
  
Polymorphism is the process by which a child class exceeds the functionality of its parent class. For example, the makeSound() function of the Animal superclass may be overridden by the noises made by the Cat and Dog subclasses. References to parent Animal objects can use the outputs of the relevant subclass after using makeSound(). There is less need for duplicate code because of this flexibility.

The public methods that we decide to expose are all that are needed for users of the parent class to communicate with complex subclass implementations. Again, this promotes reuse and modular programming. For example, a class called Food may handle fundamental properties like expiration dates, whereas its core subclasses like Produce and Meat would handle crop sorts and cut styles, respectively.  
  
In summary, the fundamentals of object-oriented programming (OOP) enable software to be developed in a manner akin to efficient manufacturing assembly lines. Differential details are managed independently by specialised subclasses, while repetitive, shared logic is centralised and inherited. This eventually simplifies the process of releasing updated product versions and resolving issues. For languages like Java, Python, and C++ to be used effectively in large-scale software development, OOP is required.

Points Distribution:

Each part carries equal weight (30 points).

Code clarity, functionality, and explanations will be considered in grading.

The essay question focuses on understanding and application of OOP concepts.